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THE JOURNAL OF PHILOSOPHY

INTUITION

AN excellent text for these reflections on intuition is furnished by a passage at the close of Fitz-James Stephens' memorable book, *Liberty, Equality, Fraternity,* (page 332):

"The one talent which is worth all other talents put together in all human affairs is the talent of judging right upon imperfect materials, the talent, if you please, of guessing right. It is a talent which no rules will ever teach us and which even experience does not always give. It often coëxists with a good deal of slowness and dulness and with a very slight power of expression. All that can be said about it is, that to see things as they are, without exaggeration or passion, is essential to it; but how can we see things as they are? Simply by opening our eyes and looking with whatever power we may have. All really important matters are decided, not by a process of argument worked out from adequate premises to a necessary conclusion, but by making a wise choice between several possible views."

It is with Intuition in this popular sense—the "talent of judging right upon imperfect materials," of "making a wise choice between several possible views," that I propose to deal. I shall have very little that is new to offer—I can see no farther into a mill-stone than my neighbors—but I hope to clarify the subject by discussing it.

The concept has various roots. First, the Cartesian doctrine that we may accept as true whatever ideas are conceived clearly and distinctly. "I call that clear [says Descartes, *Princ.* I, xlv] which is present and manifest to the mind giving attention to it, just as we are said clearly to see objects when, being present to the eye looking on, they stimulate it with sufficient force, and it is disposed to regard them; but the distinct is that which is so precise and different from all other objects as to comprehend in itself only what is clear." "We shall never err if we give our assent only to what we clearly and distinctly perceive" (*ibid.,* xlii). I think it would be unjust to Descartes to protest that every object of thought contains implicitly an infinite series of ramifications, so that its parts could never be clearly conceived, and that distinctness is therefore utterly impossible. Every term is merely a convenient and arbitrary stopping place in a potentially infinite analysis. We pursue analysis only so far as it is relevant to the matter in hand; cooks make use of the principles of

chemistry, but need not delve into the theory of atomic structures. Descartes might therefore have defined a distinct idea as an idea whose elements are clear enough for present purposes. Even with this amendment, the doctrine is not a sound one; but it is of interest here as illustrating how intuition came to be compared to vision.

For Locke uses the word in precisely this sense: "If we will reflect on our own ways of thinking, we shall find that sometimes the mind perceives the agreement or disagreement of two ideas immediately by themselves, without the intervention of any other: and this I think we may call intuitive knowledge. For in this the mind is at no pains of proving or examining, but perceives the truth as the eye doth light, only by being directed towards it. Thus the mind perceives that white is not black, that a circle is not a triangle, that three are more than two, and equal to one and two. Such kinds of truths the mind perceives at first sight of the ideas together, by bare intuition, without the intervention of any other idea; and this kind of knowledge is the clearest and most certain that human frailty is capable of" (ed. Bohn, II, 134).

In all the rationalists, the concept of intuition is greatly narrowed by the ever-present influence of geometry. They all more or less explicitly assume that the aim of philosophy is to build up a system of knowledge upon certain initial axioms intuitively known, and they are content to restrict intuition to the task of furnishing such atomic truths as "*A* is *A*," or "a circle is not a triangle."

It is Pascal who first protested against this restriction and formulated the modern concept of intuition. His discussion of the point is so brief and so clear that I shall quote it entire. I should add that he nowhere uses the word "intuition," which at that time had the special meaning we have just noticed, but the term which he does use, namely, "subtle-mindedness" (*esprit de finesse*), corresponds so closely to the modern concept of intuition that I shall translate it thus.

The passage is headed: "On the difference between Geometrical and Subtle thinking."

> In the first [says Pascal] the principles are tangible but out of the common run so that one finds it hard to turn his eyes that way and counter to all habit; but once you do glance in that direction you see the principles clearly enough; and a man would have to have utterly distorted mental vision to reason awry about things too plain to miss. But in intuition (*esprit de finesse*) the principles are commonplaces and in everybody's view; there is no need for squinting or straining, you need nothing but sharp eyes. Still your eyes must be very sharp indeed, because the principles are so delicate and numerous that some of them are almost certain to escape you. Now the omission of a single principle leads into error; so that you need to have very clear vision to see all the principles, and a well-balanced mind so as not to reason falsely on the data.

Then all geometricians would be gifted with intuition if they had clear vision, because they do not reason falsely about the data they have; and the intuitives would be geometric-minded if they could fix their eyes on the somewhat outlandish principles of geometry.

Intuitives are not geometric-minded, because they cannot apply themselves to geometrical principles, but the reason geometricians lack the gift of intuition is that they do not see what is before them, and accustomed as they are to the clear-cut coarse principles of geometry, and to reason only after having viewed and handled the data to their heart's content, they are quite lost when it comes to intuition, where the data cannot be handled in the same way.

Here the data can hardly be seen; you really have to *feel* them, and it is a matter of the greatest difficulty to make others feel them unless they have a natural gift for so doing. They are so delicate and so numerous that one needs a most delicate and skilful sense to feel them and to judge correctly about one's feeling, since we are usually without means of setting them forth in orderly fashion as in geometry.

One does not grasp intuitive principles in this way, and the undertaking would be infinite. You must see the whole at a glance, and not by progressive demonstration, or at any rate to some extent. And so geometricians are seldom intuitive, and intuitives are seldom geometric-minded, because the geometricians seek to treat intuitive matters geometrically, and make themselves ridiculous by trying to begin with demonstrations and pass on to principles, which is not the method appropriate to this kind of reasoning—not because the mind is not competent here, but because it must here work artlessly and spontaneously; because to express these matters is denied to all men, and to feel them is vouchsafed to very few.

I would especially call your attention to the fact that after accepting the comparison between intuition and vision, Pascal presently suggests that this metaphor is not quite accurate, and substitutes for it the word "feeling" as more appropriate.

Bergson follows Pascal very closely; so closely, in fact, that he takes Pascal's metaphor too literally. Consider, for example, such a statement as this: "All the operations of our intellect lead to geometry, as to the goal where they find their perfect fulfillment," (*Creative Evolution,* 210). Here is a question-begging definition which prepares the way for his final triumph over intellectualism,, and it seems to me quite obviously suggested by the passage which I have just quoted from Pascal. He explains the meaning of this dictum elsewhere by saying that "Of the discontinuous alone does the intellect form a clear idea." Since a clear idea is by definition an idea whose limits are clear, this statement is tautologous. Then we pass on to the inference that "The intellect is characterized by a natural inability to comprehend life" (*ibid.,* 165). Once more Bergson begs the question by assuming that intellect can not function unless it has clear ideas, which is contradicted by everyday experience. He gives intellect a bad name, and then proceeds to hang it. He uses the word "intellect" as though it were synonymous with Pascal's *esprit géo-*

métrique, because he intends to convert intuition (*esprit de finesse*) into a separate and superior faculty.

This conversion is effected by exaggerating the mystical tendencies latent in the word "feeling" which Pascal uses in defining *l'esprit de finesse.* "By intuition is meant the kind of intellectual sympathy by which one places oneself within an object in order to coincide with what is unique in it and consequently inexpressible" (*Introduction to Metaphysics,* 7). "Either there is no philosophy possible, and all knowledge of things is a practical knowledge aimed at the profit to be drawn from them, or else Philosophy consists in placing oneself within the object itself by an effort of intuition," (*ibid.,* 43). I think Pascal would have been much surprised to see intellect thus cavalierly banished from philosophy, and I am certain that he would say that he had used the word "feeling" metaphorically, and that Bergson misinterprets the metaphor. But neglecting the relation of Bergson to Pascal, let us consider the merits of his view considered independently.

Is it irrelevant to point out that the Bergsonian intuition bears considerable resemblance to the animistic practices of barbarians? When the Zuñis want their corn to grow, they hold a dance in which young maidens pretend to be corn-plants, squatting close to the ground and then slowly rising to mimic growth. Isn't this "placing oneself within the object by an effort of intuition"? An even better illustration is furnished by the "Leopard Men" of central Africa, who actually believe that they are leopards on occasion, and conduct themselves accordingly. This esoteric and mystical tendency in Bergson's doctrine becomes quite essential in the eyes of his disciples. When you call upon them to stand and deliver, they complain impatiently that you do not enter into the spirit of the thing; the truth is there, but you are too stupid, too blunt to receive it.

For the sake of the argument, let us suppose that the feat is possible, let us suppose that we have this faculty of sympathy by means of which we may lead the life of other things—to what can it possibly lead us? So long as we remain truly sympathetic we are led whither the thing sympathized with happens to be going, and we must perforce share its limitations. But what we wish to know about other things is always something which they could never know about themselves. Even though by some grandiose act of intuition I were able to enter into the life of the entire animal kingdom at once, the insight would be of very little real value to me. It might be interesting to know just how it feels to be an oyster, but it could hardly be instructive. It is of the greatest utility, in certain kinds of thinking, to construct imaginatively the state of mind of an animal or a person or of an historical epoch, but such imaginative constructions are the

work of intellect and must be controlled by intellect. They are nothing but guesses; they have no guarantee—no logical necessity back of them. They are therefore quite distinct in nature from the kind of experience which Bergson is describing.

This distinction becomes perfectly clear when we learn whence Bergson believes the faculty of intuition to be derived: "By intuition I mean instinct that has become disinterested, self-conscious, capable of reflecting upon its object and of enlarging it indefinitely" (*Creative Evolution*, 176). I will not take time to comment very fully upon this remarkable statement. It seems to me self-contradictory. In the first place, Bergson, like most arm-chair naturalists, grossly exaggerates the sureness of instinct. Books about insects and about animal behavior (except the fairly recent ones) have a good deal more to say about the standard performance than about the occasions on which the animal makes a fatal mistake. But even admitting that the animals are as wonderful as he thinks them, their skill depends precisely upon those aspects of instinct which Bergson hopes will be transcended. The moment instinct ceases to be interested, unconscious, and unreflecting, it ceases to work, and really ceases to be instinct. Reflection has the same troubling influence on instinct that it has on habit. Smoothness and sureness depend upon the specialized and mechanical nature of the activities. Bergson confuses the intelligent use of instinct with the instincts themselves. Left to itself and in its rudest form the parental instinct breeds anxious hostility to everything outside the family; intelligently directed it may become magnanimity. But every such adaptation is the fruit of reflection and laborious training; it is the work of intellect.

More important for us here is Bergson's insistence upon the problem of continuity. He enlarges Pascal's conception of intuition by showing that the situations we must face are not merely complicated, but are perpetually shifting. He adds the dimension of time. I will neither propound nor refute his theory of how intuition, as he defines it, manages to integrate discrete experiences or phases into the continuum of which we are conscious. That this work of unification is an essential feature of intuition seems to me obvious; that it is accomplished by a faculty distinct from intellect, and related in some mysterious way to instinct, seems to me patently false.

I now come to the main topic of this paper, which is the nature of intuition as I have defined it previously, namely, the talent of judging right upon imperfect materials. I shall first give a few reasons for believing that it is *in its nature* a development of *a priori*

knowledge, that is, immediate cognition, just as it is descended *historically* from *a priori* knowledge.

A priori knowledge is essentially the realization that there exists some sort of relation between two or more concepts which are before the mind. It is the sudden vision of a relation. I say "sudden" because this quality is always associated with the experience of seeing a relation. We reflect for a moment and suddenly find the relation there, with no preliminaries or explanations; and we feel that this curious suddenness is somehow responsible for our inability to explain why the truth of the relation should be accepted.

Since relations condition all thinking, it is impossible either to define them or to say whether they are purely mental or whether they are indepenent of mind. One might be tempted to reason on this line: without qualities there are no relations; without relations there are no qualities; without both there can be no such thing as structure. But it would be absurd to say that during the carboniferous epoch or earlier, when there were no minds capable of supplying relations, the earth had no structure. The reasoning is false. All that you are entitled to believe is that during the carboniferous epoch the world was the sort of thing which at present we think about in terms of quality and relation. We project relations into the past because we are constitutionally incapable of thinking at all without them.

They are not only conditions of thought; they seem to be likewise fixed conditions; mental categories. That is why they have the curious quality of being self-evident and unmistakable. People make innumerable mistakes about sense-qualities, but never mistake a relation if it is fairly set before them; there is no such thing as the "pathology of the sense of relations." You may object that a man whose vestibular organs have been seriously injured often feels uncertain whether he is upside down or not, and will therefore make mistakes about on-ness and underness. But what has been distorted is merely the *qualitative* side of his experience. The landmarks by which he usually judges about his orientation are presented in a wrong order and his perception of their relation to each other *as they are presented to him* is perfectly correct. Many persons are unable to distinguish between red and green of equal saturation, but there could never be a case of a man with normal retina who, when confronted with red and green together, can not appreciate the otherness of one color with respect to the other. Probably we have to learn to see relations, and I believe there are relations which have no word to express them. But once we are actually able to see them, we can not be mistaken about them.

Now if this is true—if relations are mental categories—we can see at once why there can be no arguing about them, why they are self-

evident. We realize also that they appear suddenly to the mind because they are, as it were, bodiless; they have no parts and so nothing can be said about them considered singly.

If we compare them among themselves, however, we discover a fact of great importance for our present purpose. We see that they can be ordered into hierarchies, comparable to the hierarchy of animal genera and species, passing from the most specific to the most general. Consider, for instance, the series "father-parent-ancestor-predecessor-before-different from." "Father of" is certainly a relation. What do we mean by saying that it is more specific than the relations which follow it in this list? We mean that it contains more ideas and feelings, more of the qualitative side of thought. It is a systematic relation in the sense of fixing the relation of concepts to each other in an organic system of ideas—in this case partly social and partly biological. The relations "before" and "different from" are not systematic. They refer to relations which may occur in *any* system, even so simple a thing as two letters printed one before the other.

What does this imply? It implies that in our daily thought many of the most important relations which we use are not pure relations at all, but are merged or fused with conceptual (*i.e.*, qualitative) elements. Thought is not a kind of algebra, in which discrete concepts are put into equations by means of relations; concepts are not atoms but systems, and their true relations to each other are not to be grasped by means of such words as "different from" or "equal to." We think, as it were, in clumps of ideas, and the relation between these clumps is usually what I just now called a systematic relation. Often it is so complicated that we have no convenient word for it, and are obliged to use the periphrasis: "the relation of wages to tariff" or "the relation of sugar-utilization to the hydrogen ion concentration," but those are extreme cases.

If we analyse systematic relations, stripping off the qualitative elements, we shall always find a core of pure relation. That fact is very clearly revealed by the tendency in language to make this pure relation somehow explicit. We say, for example, that the snow melts *away under* the spring sun. This is particularly true of Latin, in which verbs—the commonest vehicle for expressing systematic relations—usually have a prepositional prefix.

When we are thinking about some fairly intricate matter, it is this core of pure relation which the mind seizes upon first, and which gives us a clue to the general organization of the whole situation. But precisely this work of organization is one of the functions of intuition. On this side of its nature, therefore, intuition is clearly

an extension of the faculty or process by which we perceive pure relations—that is, of immediate cognition.

This, as you see, is a very fruitful field for speculation; but I have no time to explore it now, and must pass rather abruptly to another phase of my subject: the relation of intuition to thought in general. I wish to show that intuition is not an independent faculty, existing as a kind of rival or parallel to intellect, but is inextricably mingled with all intellectual processes, and should be regarded as a phase of intellect. To do this, I shall treat of two problems which seem to me fairly concrete. From the way in which these problems are dealt with you can see how the subject as a whole might be treated.

When a child sees an orange for the first time he will naturally stretch out his hand for it. If he is a year old he will certainly try to seize it. Notice carefully how this action is performed: he puts his hand around the object, well beyond the part of it that is nearest him.

He already knows then that the orange is spherical, although all that he actually sees is a patch of color. He apperceives the orange, as the psychologists say; he interprets the play of light and shade on the orange by means of his past experience with rubber balls. I think it would be quite as accurate and perhaps clearer to say that he makes a correct judgment upon imperfect materials. He had learned to see the systematic relation between roundness with a certain type of shading and sphericity, and this insight gives him a kind of mental frame on which to build ideal structures beyond and around the insufficient data of his senses. Apperception is, therefore, a case of intuition.

Its rôle in conception is analogous, and suggests a theory of conception which might, if completely worked out, avoid most of the pitfalls into which logicians commonly fall when traversing this part of their science.

The current and erroneous theory of general concepts is thus formulated by Bradley: "The class is mental. It is no group of things. It is our own private way of putting images together within our own minds." "But, [he goes on] at the risk of seeming to affect singularity, I am bound to assert that within my own mind I can not find these classes. By a class I suppose you mean a group of images which actually exist; but when I come to the facts and look into my mind and survey what is there when I hear the word 'mammals' or 'triangles' or 'cats,' I scarcely ever am able to find an actual group. The idea that 'mammals' is the name of a flock of mammal-images, herded together in my mental field, and that among these I can see the little pack of dogs, and all the cats sitting together, and

the rats, and the rabbits, as well as the elephants, all marked with curious references and cross-references to heads 'quadruped' and 'carnivorous' and 'placental' and Heaven knows what else—I do not think that this looks like a fact" (I, 175).

James has described the actual experience which accompanies the use of a general term very aptly (I, 472): "The sense of our meaning is an entirely peculiar element of thought. It is one of those evanescent and 'transitive' facts of mind which introspection can not turn round upon, and isolate and hold up for examination, as an entomologist passes round an insect on a pin. . . . This added consciousness is an absolutely positive sort of feeling, transforming what would otherwise be mere noise or vision into something *understood.*" "It pertains to the 'fringe' of the subjective state, and is a feeling of tendency, whose neural counterpart is undoubtedly a lot of dawning and dying processes too faint and complex to be traced."

Both Bradley's criticism of the "image-groups" and James' positive statement that the meaning of a general term is a "feeling of tendency" which we can discover or glimpse in the fringe of consciousness seem to me admirable, but they do not take us far. In fact, they prove very decisively that the problem can not be solved by introspection. We must try another line of attack.

As I have already said, it is from the examination of perception that we may hope to learn something about the nature of concepts. We saw that when the child sees an orange for the first time he intuits its sphericity—that he has a mental frame which he combines with the inadequate sense data which are presented to him. Do you see what this implies? It implies that general ideas are prior to particular ones. The child begins by confusing the orange with his rubber ball. It is only by means of the new context which is supplied by sense—in this case the orange color—that permits him to individualize the orange.

This, I believe, is true not only of immature minds, but of mind generally. The essence of an idea is some systematic relation which it contains—its pattern—and not its imaginal content. All concepts are general concepts until some context is added to make them particular. This ought long ago to have been suspected from the structure of language. Practically all the words we use are clearly general or universal. We can make up proper names to refer to particular dogs, if there is any need for it, but the word "dog" is general. Particular meanings must be achieved by adding demonstrative pronouns or some other kind of context. *As image* a thing may be perfectly particular and definite; *as idea* it is always general at first and must be individualized before it begets a particular idea.

This last distinction is of the greatest importance. Ideas are

not images. Sense-data may be material for thought, but thought can not be derived from them by any kind of philosophic *legerdemain.*

The objection which undoubtedly will occur to you at once is that I have said nothing about attributes or universals, such as "white" or "warm" or "recommendable" or "kindly." The supposition that there is such a thing as the class of all white objects or of recommendable things, *etc.,* is obviously silly. In what sense, then, may these concepts be called general? Isn't the distinction between general and universal, which seems so clear to us, really sound?

I will answer the question in this way: universals constitute a special branch of concepts, but they are none the less general. "White" means the class of white-sensations. Examine a large number of adjectives and you will see that they fall into three groups: first, those that are adjectives only in the grammatical sense—nouns parading as adjectives; "umbelliferous" is really nothing but a formal adjective; when one uses the word, one really means "umbellifer;" second, adjectives which are true universals, and mean elementary sense qualities or elementary affections; thirdly, bastard adjectives, in which the core of the meaning is a universal, but which have become associated with stereotyped situations in which this universal figures prominently; thus "kindly" means "good," that which creates an expansive organic attitude, but it has picked up a great many other elements from its various contexts.

I know this is very far from clear, but I have not time to deal with the subject with any thoroughness here. I want to go back to our mammals, which are much simpler.

Suppose I am standing at the prow of a ship and suddenly catch sight of a whale. I will naturally cry out to my companions: "There is a whale!" We are dealing here with the perception of a particular object. Just what goes on in my mind? The word "whale" stands for a concept. When I see the huge gray bulk moving slowly through the water, and the high column of spray thrown up from the head, I assimilate all this with the concept. But what is the nature of the concept "whale"? It certainly does not contain fleeting glimpses of all possible postures and varieties of whale—whales diving or breaking a boat with their tails, cachelot, spermacetti, hump-back, greenland, and killer whales. Essentially it is a word which is associated with a group of concepts forming a variable system that may be turned into any kind of whale you choose. The important thing to observe is that I need use only that part of the whale-concept as is relevant to the present situation. In order to recognize a whale I need only the word "whale," the hazy image of a vast bulk with spray, and the realization that "this

is that." I do not need to have in the fringe of my consciousness any awareness that whales are growing scarce and that whale-oil soap is used for spraying roses. The word "whale" would lead me to these ideas if they were in any sense relevant.

Finally, suppose I say "Whales are mammals." Here, again, only the relevant parts of the two concepts are used. The bulk and spray may disappear. Warmth and perhaps an image of a very ill-defined young whale at his mother's side plus the word "whale," are all that are needed.

The point which Bradley and James fail to clear up is this: when you think about whales, is there anywhere in your mind, whether in the fringe of consciousness or in subconsciousness, a general concept that includes the essence of whales, or epitomizes all that you have learned about them? I would answer that such a thing is what Bradley loves to call a chimæra. When you think, you think for a purpose, and this purpose determines the sphere of your thought. You have just such potential associations as your experience warrants, but they remain potential. The only bond which connects all your whale-experience in a special degree is the existence of the word "whale."

Judgment, then, is the intuition of relations. Where the relations are pure, judgment is almost instantaneous and is self-evident; where the relations are systematic, judgment requires a more complicated insight and will be slower. In propositions of the form familiar in logic the two terms define the parts of each which are relevant to the other: If I say "whales are mammals," "mammal" brings out the side of "whale" which makes the two words congruous, and "whale" fixes the variable elements of the concept "mammal." The traditional logic drew its forms from the excessively general relations observable in classification, and never succeeded in getting beyond this limitation. But logic is essentially the science of congruities and of systematic relations.

I have lingered over these lower forms of intuition, partly because they interest me, partly because they give a clue to the nature of the highest form, that is to say, of intuition as the talent of judging rightly in contingent and intricate matter, where each factor is functionally related to every other factor—physiology, legal and ethical casuistry, problems of international politics, questions of historical probability, and so forth.

Pascal says that in such situations one must see the whole at a glance, and Professor Sorley has even coined the expression "synoptic vision" to describe the process; yet I must confess that the word "vision" seems to me somehow to beg the question. We get a result which suggests an effect of seeing the whole at a glance, but for my

own part I am never conscious of getting all the details or even the general outlines of a problem in my mind at the same time.

Another consideration ought to warn us against too simple a theory: the extraordinary diversity of methods and mental processes revealed by the history of science. A great deal of what has proved most valuable to us is the gift of chance. Chemistry owes much to the blind puttering carried on in the shops of craftsmen, and in the laboratories of gentlemen-chemists of the eighteenth century, when it was fashionable to know something about "the new kind of air" and the subtle fluid phlogiston. The greatest advances in biology and medicine sprang from nothing but ordinary vision—through a compound microscope. The discovery of a fact may automatically interpret phenomena which baffle intuition. The discovery of new planets might actually be accomplished by applying Mill's famous "canons of induction" (which are not canons at all, and apply to very little else than planets); while the periodic table of Mendelieff seems to imply that he really possessed something like "synoptic vision." We must guard against accepting a method of analysis, by means of which we present the results of thought to ourselves or to others, as an accurate account of how our minds actually work when we are solving a problem. Since thought must be adapted to the peculiar exigencies of its object as well as to the habits of the thinker, the picture we can draw of intuitive thinking will have to be disappointingly simple and general. To reach it we will follow the clue to which I referred a moment ago—the analogy between simple intuition and the complex type.

We saw that the essence of a concept is some systematic relation, and that the qualitative elements in it may be varied so long as they continue to furnish the ground for this relation. I would like to carry over this metaphor to the broader field of integrated systems.

Suppose a psychologist is studying emotions or affection generally. He wants to get some idea of the physiology of respiration—just enough to explain the changes in breathing which he observes in his laboratory. It is quite likely that after reading up the subject he will proceed without making any serious blunders on the physiological side. But in order to be absolutely sure that he is not making blunders he would have to study, not merely the physiology of breathing, but the whole science of physiology. This is, of course, because ultimately respiration is functionally related to all other bodily functions. So long as the psychologist uses the concept "blood stream" within certain limits, he will be safe. But he can not know just what those limits are without knowing about the buffer-substances of the blood, the effect of action currents on osmosis, and a hundred other things.

However, the *physiologist* does not need to have a kind of bird's-eye view of physiology in his head whenever he thinks about his problems. He is free to isolate parts of the subject, because he knows what might be called the "elastic limit" of the concepts he is using. Concretely, if he is carrying on a series of experiments on digestion, he knows that if the manipulation to which he submits his animals is too violent, the pain will seriously interfere with the process he is studying and vitiate his results.

Thus the "vision" furnished by intuition is really a kind of super-concept, constructed by means of language, whose accuracy depends upon continued awareness of the limits of its constituent concepts. To follow out the visual metaphor, when we think about an intricate matter we are like a scientist with a microscope who is presented with a complete set of prepared slides made from various regions of the human body, and asked to infer what the whole body is like. He must scrutinize each slide with the greatest diligence, but having learned its nature, he sets it down in its proper pile and goes on to the next. By and by he will have on his table an array of little piles of slides. When he looks at one of them he no longer sees the tissues on it, he merely knows that it is vascular or pyramidal cells or hair follicles of what not, and he can begin to think out what the relations of these piles to each other must be.

If the tendency of these speculations is correct, there is no such thing as a faculty of intuition, different in nature from other intellectual processes. The suddenness with which we see an explanation or a system is really not very significant. In some cases it is doubtless due to what is loosely called "unconscious reasoning": having previously thought out many of the steps needed for the explanation we are seeking, we hit upon the final solution at a time when all this preparatory work is for the moment forgotten, or at all events latent. Usually the discovery seems sudden because the essential relation, about which the whole system we are studying is constructed, happens to be relatively pure. But systematic relations present all shades of purity, and if a scale of speed were possible in such matters, we would probably find no sharp line between the sudden cases and those which would be set down as reasoning of the ordinary sort.[1]

[1] I have said nothing here concerning the choice between alternative views or plans of action. Intellectual alternatives can not be discussed without some reference to the theory of probability; ethical alternatives involve the theory of value and the question of the freedom of the will. Even if I had novel and plausible ideas about these questions, I am afraid I could not sketch them lightly.

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VALUE, SUBJECTIVE AND OBJECTIVE[1]

WHY does the order of physical events possess an objective, an external, existence which we hesitate to ascribe to the system of values? Primarily because it is the common field in which occur our motor responses, and by the limitations which it imposes upon these movements or attempted movements of ours, it establishes its own independent existence. All scientific observation is subject to such external control; sensory apparatus must be readjusted at the behest of external fact. The scientific observer must, as we repeat, keep an open mind; he must be prepared for surprises as he surveys the field of his microscope or telescope, be compelled, that is to say, to make unexpected stoppings, shifts, and changes in the responses of visual accommodation and fixation. Despite what their prepossessions prepared them to see, Galileo's opponents, when they looked through his telescope, were compelled to adjust their gaze to the presence of Jupiter's satellites even though they might ascribe their appearance to the devil. Likewise the manipulations and technical expedients of scientific experimentation are subject to external control: the chemist who embarks upon an extended experimental investigation must be ready to alter his procedure the moment an unexpected turn of events calls a halt in his projected plan of operation. Physical science tends to neglect all the properties of bodies except the geometrical because geometrical properties can be compared with precision by processes of measurement. But measurement in its primary form involves physical manipulation under very complete external control: two lengths are compared by juxtaposition with a third standard length.

While the limitations which it from moment to moment imposes upon our motor responses established the *existence* of the physical order, it is not our motor responses or the limits placed upon them which give us our *knowledge* of the external world. This comes through the response of intelligent, and therefore selective, interpretation which accompanies motor responses when they reach a certain degree of complexity. This second-named response identifies the object as possessing certain characteristic qualities and relations, as in fact a distinctive blend or pattern of qualities which, since they are universals, set it in interrelation with a variety of other objects actually or possibly present. As the motor adjustment establishes the existence of the object as a physical event, so the intelligent interpretation attributes to it a distinctive character which

[1] Read at the meeting of the Western Division of the American Philosophical Association, Chicago, Apr. 1–3, 1926.

in its permanence reflects the habitual activities and continuing interests of individual life.

These two responses are both involved in perception as we know it. Both are integral parts of one response which is foundational to our human experience. Both are aspects, I am tempted to say, of one response, but this suggests parallelism which is an altogether mistaken view of their relation. The two responses, or the two phases of the one response, are functionally interdependent. The motor adjustment evoked by the external stimulus induces the response of intelligent interpretation. But this second response anticipates the possible consequences of this movement when completed and guides us toward these results. The intelligently directed movement which follows is experimental, however; in its turn it is controlled by the outcome of the subsequent movements which it has instigated. For this, as a series of events intruded into the physical world, is subject to control, *i.e.*, to check, by external conditions. But while the external environment may by interrupting the movement reject the interpretation which guided it, it supplies no alternative interpretation. This must be furnished by intelligence, and instantly, on pain of complete failure or quick disaster. Not that intelligence always supplies (or is able to supply) in such an emergency an alternative interpretation to the one rejected; frequently it is compelled to begin again at the bottom, as it were, interpreting the plight in which it finds itself as registered by the numerous incipient movements called forth by the unexpected situation, and, from this new standpoint, recasting the original and guiding interpretation. So selective interpretation and bodily movement work together in closest interdependence, with constant give and take, not as two accompanying responses merely, but as integral factors in one unitary response.

Let us consider, now, the qualities which are attributed to objects in the response of interpretation. The qualities, as we should expect, in view of the relation just explained between the two part-responses, fall into two classes. There are first those attributes which connect themselves with our powers of movement, each individual occupying, as he does, the centre of his own field of vital reaction and motor response. These are the spatial and physical properties of things: to the percipient each object has its own location relative to himself and to intervening objects, its own size and distance, its own motion and weight. Secondly there are those qualities which relate themselves to powers of selection, appreciation, enjoyment, in the individual. Roughly speaking, they are the familiar "secondary" qualities. These qualities, unlike the spatial properties whose only differences are differences of determination within the one field of magnitude, have differences in character, in intrinsic nature, that

are inherent and essential. Indeed, it is by virtue of such qualitative differences, and particularly of the patterns and harmonies of such differences which they present, that objects appeal to us and furnish us enjoyment. So the apple whose location in that dish on the table merely gives it place in my visual field and has no relation with any of its intrinsic properties as an apple, this apple appeals to me because of its color, fragrance, ripeness, sweetness, each reinforcing the other and blending in an attractive harmony. So the blue sky, the bright sun, and the fresh air of a summer morning, and the warmth and color and snug fit of a winter coat. Of course, it would be a mistake to identify qualities of the first class too completely with extensity as perceived by the eye or through the sensations of touch or movement. For color, as we know, and even sound and movement, frequently figure as signs of distance. Likewise it would be a mistake to restrict the second class of qualities to colors, sounds, tastes, and temperatures. For extension is inseparable from color and form, and spatial properties themselves, when attributed to an object in independence of its position in the physical system and so appearing as symmetry and proportion, may increase its appeal to the intelligence that selects and appreciates. No, the fundamental difference is one of function. On the one hand, we have those qualities which indicate or define the position of objects relative to one another in the order of space-time to which the human individual must respond with movements of his own if he is to preserve his existence and extend his experience, and, on the other hand, we have those qualities which promise satisfaction to all individuals who fulfill the motor conditions of their realization.

Perceptions are primarily plans of action; they project courses of possible movement and identify sources of possible satisfaction. But the testing of a perception by motor response does not always await the beginning of overt action, not to speak of its ensuing procedure or final result. It is true that the movements represented by, or implied in, the perception are those of the whole body in approaching or appropriating the object and the satisfactions are those expected when it is put to the use for which it is intended. But the movements actually evoked by the initial interpretation are adjustments of the distance receptors adapted to detect those qualities whose presence guarantees in advance of more extensive movements that the results expected and desired will follow when the movements are made. In the case of many, if not the most, of our perceptions, therefore, the interpretation, based, of course, on past experience, induces an immediate response of sensory adjustment which, if it proceeds unimpeded, imparts at least a provisional objectivity to the interpretation. So familiar objects are frequently

perceived through a progression of interpretations each subject to the control which external conditions exercise over our adjustments of sensory apparatus, and each more definite and meaningful than the last.

Physical science, as noted in the beginning, interprets the world of objects in terms of those primary qualities which reflect the external control exercised by the environment over our motor responses. But the response of intelligent interpretation one of whose eventual products is physical science itself, is not thus determined; it is by nature selective. While it is aroused to activity by external stimuli that evoke motor readjustments, its activity is governed by habits and tendencies that reflect the life-interests of the individual. Only objects that appeal to these interests, positively, or by way of threat or menace, are subjected to attentive scrutiny; other objects are only observed sufficiently to discover them harmless or indifferent. Now objects appeal to individual intelligence in virtue of the blend or pattern of different qualities which they exhibit:[2] the patterns of light and shade and color, the harmonies and rhythms of tone, the blends of taste and odor, the interweavings of form and texture and temperature, in varying degrees of complication and interrelation from the most intimate fusion to the most arresting contrast. These are the attractive and appealing features of the things we perceive and imagine, why they capture our interest, why they promise us satisfaction. They give value and zest to life; for what we enjoy in the things about us and relish in our commerce with them is just these combinations of intrinsically different yet mutually interpenetrating and enhancing qualities that characterize them.

Because of this appeal which certain objects make to us when perceived or imagined, they are adopted as ends of action. We seek, as we say, to *realize* them, *i.e.*, to enjoy in actuality the qualities we have anticipated in idea. In what does realization consist? Why, we may ask, is the object when merely perceived or imagined *not* real? The answer is: Because the interpretative responses which project the object as a complex of qualities in the field of ideal possibility are opposed by other responses, sensory and perceptual, aroused by the motor adjustments called forth by the existing environment. Hence the object as an end is only maintained before consciousness by an effort of attention, and the various responses required for a full exploration of its interrelated qualities are altogether precluded. If the object is to be realized, the individual

[2] Inevitably this interest extends to the action by which these objects are attained and their qualities enjoyed. First to the sequence of bodily movements, then to the physical instrumentalities and processes through which these movements are extended into the outer world and made effective in producing the desired result.

must make the sequence of movements which are necessary so to alter the external conditions of his activity and his own relation to them that the responses at his command no longer hinder or prevent an appreciation of the object, but rather establish and reinforce and amplify its constituent qualities and their reciprocal relations. Now that the fruit is in my hand and no longer in the display window I may look closely at its shape and color, feel its hard and glossy or its soft and velvety surface, smell it, taste it, eat it.

When an object on direct acquaintance or immediate experience yields the satisfaction it promised, its value is established. The attempt by an examination of many satisfying experiences to discover what is common and essential to all satisfactions, in what satisfactoriness itself consists, has led to several interesting and plausible theories. It will be quite sufficient for purposes of the present enquiry, as well as in accord with the probable truth of the matter, to say that the satisfactoriness of objects depends upon the degree to which they extend, diversify, and harmonize the vital and intelligent activities of the individuals who seek and realize them.

If we mean by value the capacity of objects to afford satisfaction to individuals there is then no doubt that values exist. They have this satisfactoriness in virtue of the complex or pattern of different qualities they present. There is no question of the existence of values in this sense; every individual may verify it for himself. But the objectivity of values means more than this. It means that objects in virtue of their distinctive nature (resolvable into terms of their component qualities and constituent relations) are able to yield characteristic satisfactions in which intelligent individuals can share. Now it is obvious that this can not be said of the value of objects in immediate experience. In this case their satisfactoriness depends upon conditions peculiar to the individual who realizes them, upon his psycho-physical constitution, his past experiences and his present circumstances. These conditions produce different interests and desires, different capacities for enjoyment and appreciation, in different individuals. Hence, while values indubitably exist, in the sense that objects in virtue of their intrinsic qualities are able to afford satisfaction to intelligent individuals, these values appear in many, if not in all, cases, to be subjective, *i.e.*, relative to the desires and tendencies of individuals.

Are values ever *objective,* do they form a system comparable in its objective reality with the order of physical events? If so, by what means and in what way? As a preliminary to the effort to answer this question we may find it helpful to remind ourselves of three factors which psychologists ordinarily distinguish in perception (at least when it involves explicit recognition) and of which we took

no notice in describing perception as a case of selective interpretation. I mean the supplementing of the sensory qualities apprehended, by images particularly verbal, by habitual movements, and by the feeling of familiarity, this latter being variously explained as a pleasant relaxing of instinctive fear of the unknown or an agreeable titillation of fear, curiosity, and assurance, on discovering the familiar in new surroundings.

These three factors stand out more clearly in their character of responses in case the object perceived or imagined is sought and realized and its constituent qualities in this way opened to free exploration and enjoyment. Suppose that a boy who has for months been working and saving his money to buy a bicycle at last receives the coveted object from the hands of the expressman. His attention is at first altogether absorbed in keen and eager scrutiny of every feature of the brand-new machine; not a detail of color, finish, or graceful outline escapes his delighted observation. But if, now, circumstances prevent him from going at once for a ride, his appreciation will be heightened by several additional responses. The first is a response of memory and understanding. It involves implicit movements, principally of the speech-apparatus. Consciously it augments appreciation by reminding the boy of the circumstances which have led up to the present moment of joyful ownership, of the long time he wished vainly for a "wheel," of his first glimpse of this model in a shop-window, and his resolve to earn the price of it, of his hours of hard work and the slow accumulation of his savings. The second is a response of the powers of action. The boy's enjoyment is increased by a realization of the different things he may do with the bicycle now it is his. On the motor side slight movements reproduce in barest incipiency different courses of action made possible by the possession of the object. Consciously, practical intelligence suggests the various uses to which the bicycle may be put: riding to and from school, going for holiday excursions in the country, delivering packages and riding on errands. The third response is one of emotional expression and esthetic perception. Deep-rooted impulses are stirred in the boy, such as ownership, curiosity, mastery. A surge of emotion accompanies these reactions: the boy feels keenest elation, a fierce joy of proprietorship, and a wonder that satisfies itself in constantly renewed exploration. This emotion finds bodily expression in the smile, the laugh, the shout; the boy hums a tune, cuts a caper, dances a jig. With the release of emotion imagination is stimulated which in its turn adds fresh fuel to the fires of emotion—the boy is transported with joy, he is "just too happy to live."

These three responses increase the value of an object sought and

attained by taking it out of the field of immediate perception and relating it to the life-history of the individual, to the facts of his past experience, to his practical interests and abilities, to his ruling sentiments. The value of objects may be thus augmented, however, and still remain subjective, the three responses in question serving merely to increase the satisfaction which such objects furnish to individual desire.

But these three responses of articulate speech, practical contrivance, and emotional expression, when developed by exercise, are capable of giving objectivity to values by relating the satisfactions which objects furnish to the individuals realizing them, to universal human experience and so rendering them susceptible of general verification. This they are capable of doing because of certain outstanding characteristics that distinguish them from all other motor responses. Articulate speech, practical contrivance, and esthetic expression owe their peculiar importance, first, to the fact that while they are bodily movements occurring in the physical world they are nevertheless to a remarkable degree under the control of individual intelligence, and, second, to the equally important fact that while their formation is socially guided and controlled throughout, they are at the same time specially fitted to express what is unique and original in individuality.

In the matter of conscious interpretation, now, just what is accomplished by these three responses? Consider, first, articulate speech. By this response the object of present experience is correlated with other objects previously experienced by the individual himself or by his fellows at different times and places, which possess the same or similar qualities and set in relations which characterize all objects of this kind or class. Suppose that when I am sitting outdoors a beetle lights on my sleeve. I may glance with admiring curiosity at its odd markings or flick it off with instinctive aversion. But if I am versed in entomology I can identify it by its scientific name and this name will be a key to its structural peculiarities and life-habits, its place in the family of beetles, its genetic relations to other insects, and to the many diverging forms of evolving life. Practical contrivance as a second of these three responses takes objects perceived and possessed, and by manipulation, construction, and experimentation makes them instrumental to the rational uses of human life in general. A litter of small boards, copper wire, screws, brads, etc., on the tool-bench in the basement of my house frequently meets my eye and is on occasion brushed aside with impatience. But my son takes these materials and constructs out of them an essential part of a radio-receiving set and thus these insignificant bits of wood and metal assume a new dignity as expres-

sions, embodiments, of the power of practical intelligence to adapt materials and forces to its comprehensive purposes. Finally, there is the response of emotional expression and esthetic perception. In this case, the enjoyment of the object as a pattern or harmony of distinct yet mutually reinforcing qualities calls forth a response of sensory adaptation and muscular adjustment whose effect is to kindle imagination and endow the object with suggestions of universal or typically human meaning. The beauty of the wild flowers growing in the trenches of Flanders have suggested to many observers as well as the painter and poet the frailty and the heroism of human nature, the shortness and the splendor of human life.

The values which we discover in existing things by these distinctively human responses of rational discourse, practical adaptation and esthetic appreciation, form a system just as truly as physical objects do. Not a world or order of physical determination surely, but a world or order of intelligent community. Its constituents are not masses in motion or events in space-time, they are the rational insights, the practical inventions, the esthetic intuitions which are by essential nature *communicable.*

How is the objectivity of such values established? In the same way that our perceptions and conceptions of physical existence are proved objective: primarily by the results of movements we make under the guidance of these ideas, which *qua* movements are also controlled by the conditions of our natural and social environment. Only in the case of the values in question the movements are not, or are not wholly, bodily adjustments in the large, but motor adjustments of the highly specialized kind just described. Through the speech response the individual is enabled to compare objects directly experienced and enjoyed on different occasions by himself and others with respect to their constituent qualities and relations and thus integrate their meanings within one comprehensive and consistent system. Through the response of practical contrivance he is enabled to combine different materials and forces employed in action and to test their serviceability to the rational purposes of human life which enlist the coöperative activities of all men. Through the response of emotional expression and esthetic perception he is enabled to appreciate harmonies of sight and sound that convey intimations of universal human meaning. By an abstraction difficult to avoid in exposition, we have treated these three activities as if they were three separate and distinct capacities working in independence of one another. Just the reverse is, of course, what actually happens: they work in closest interdependence, are, as a matter of fact, interconnected and inseparable in activity and result. For example,

practical invention and scientific investigation go constantly hand in hand.

Hence the individual who would realize these values for himself must acquire from his social surroundings language habits, practical skill, and esthetic discriminations as well as develop his original capacity for using these responses as tools of exploration, experimentation, and appreciation. Then the accumulated culture of the race, literature, mechanical arts and appliances, social and political institutions, products of fine art in all its branches, embodying the insights, inventions, and appreciations of his fellows will provide him with a means of interpreting objects of direct experience in terms of inclusive human life and experience. And the three responses in question, when thus trained by exercise in the field of social intercommunication, will equip him with permanent symbols in which to embody his own discoveries, practical achievements, and artistic creations and thus make them part of the spiritual heritage of humanity.

Are these values which must be considered objective because susceptible of general human verification, created by the social intelligence of man, or merely discovered by human reason? If by creation we mean worked out through constant active intercourse with the external environment, by courageous exploration and experimentation, construction and reconstruction, I should say *created*, by all means. But unless the capacity for disclosing to operative intelligence a system of communicable meanings were resident in the external environment, it is difficult to see how these values would ever have been realized.

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BOOK REVIEWS

Scientific Method in Education. W. C. Trow. Boston: Houghton Mifflin Co. 1925. 159 pages.

Even a slight acquaintance with present-day educational literature is sufficient to reveal the presence in that field of a widespread and somewhat self-conscious determination to be scientific. This trait or attitude is, in fact, the outstanding characteristic of what is sometimes called the new education. It is likewise a most hopeful sign, since it indicates that there is considerable elbowroom in education for new ideas. At the same time the enthusiasm for scientific method is sometimes a cause for concern, since it seems to be accompanied by a tendency to overlook the larger issues of education. An at-

tempt, therefore, to evaluate the significance of scientific method in education is of more than common interest.

It may as well be said at the outset, however, that as a contribution to the clarification of issues this little book is somewhat of a disappointment. In the first place, nearly two-thirds of it is a sort of condensed logic, describing the nature of scientific procedure and the fallacies to which it is exposed. The exposition is good, but does not aim to be original, and the references to education are purely incidental. This division of space is reminiscent of Huxley's remark concerning Kant to the effect that his baggage train is larger than his army. Secondly, the application of scientific method to education is covered in about thirty pages and consists of nothing more than showing that the methods of psychology, of medicine, of sociology and economics are being employed nowadays in the solution of educational problems. Lastly, there is a concluding chapter which carries the wholly unwarranted implication that the entire field of educational objectives has been surveyed, at least in the rough. In other words, there are problems of educational psychology and sociology and the like to be solved by appropriate methods, but there is no problem of ideals or ends involving a method of its own. These ideals present no problem, because they accrue to us inevitably. "When science is viewed as a method, ideals and objectives become the direct outgrowth of its application" (p. 144).

As an illustration of how this comes about the author points out how the objective of health has been set up in education. First, the children are examined in order to find out why their work is unsatisfactory, why the results aimed at are not achieved. Various disorders are then discovered, and this leads next to the hypothesis: "If steps are taken to keep pupils healthy, they do better work in school and afterwards" (p. 146). In the author's view this development covers, in principle, the whole subject of ideals. That is to say, the question of how ends should be set up in education is answered by showing how we determine the proper *means* for the realization of ends, when there is no question about the ends at all.

I have no wish to take issue with the author's contention that all inference in education should conform to the spirit of scientific method. This contention is simply an insistence that such inference must be kept free from bias and prejudice; that it must have a proper regard for evidence. Nor should I care to dispute the statement that "any objectives and ideals, whether they appear in the field of education or in the realm of the phenomena with which chemistry deals, or psychology or economics, come as a result of solving many problems" (p. 147). Certainly they come, and they come, often enough, as byproducts of something else. To put it differently,

the discovery of the means for the solution of a problem frequently furnishes the raw material for new ends, new ideals. My dissatisfaction springs from the fact that the author seems to be content to show how they come. What we are to do with them after they have come does not seem to trouble him. Yet, as everyone knows, these objectives and ideals come into all manner of conflict with one another, and on these conflicts hang the issues of life. In other words, there is a problem of ends, and this problem does not disappear simply because we have made up our minds to recognize no problems save those which permit us to employ scientific technique, on the ground that science in this sense is "a method of solving problems wherever these problems may chance to rise" (p. 144).

There is an unmistakable tendency in education to slur over the problems of ends. This may be a reaction from the inexcusable vagueness with which this subject has frequently been handled, or it may be due to the fact that it has usually been labeled as philosophical rather than scientific. It is admittedly a topic that does not lend itself readily to treatment in terms of graphs and statistical tables. And it is only too evident that many of our enthusiastic scientists can live and breathe only in a panoply of weights and measures and columns of tabulation. They do not necessarily claim, to be sure, that "scientific method" is confined to this sort of thing. But no other kind of undertaking seems to have any reality or substance. The result is naturally that education never comes to embody any significant social program beyond conformity to environment. What, for example, should go into the curriculum? Ask bank employees what people should know about banking (p. 122); study magazines and newspapers to find out what should go into the courses of civics and history—*und dergleichen mehr*. As a means for gathering data all this may very well be commendable. As a substitute for a social program to be realized through educational agencies it is hardly respectable.

It is a great pity that our fine enthusiasm for science constantly threatens to become an obsession. When perspective is sacrificed, the cultivation of scientific method ceases to mean the liberation of intelligence and becomes the symbol of a new bondage. If our homage to progress and to the efficacy of intelligence is to be more than lip service, it devolves upon education to prepare the way for a progressive reconstruction of the social order. Whether the attempt to secure a unified and articulated outlook on the place of education in the social order is to be called science or philosophy is perhaps a minor matter. That such an attempt can be carried on in the spirit of scientific method, there seems no reason to doubt. And this must

be done if scientific method is to become a means of developing significant educational leadership for the future.

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Essentials of Scientific Method. A. WOLF. New York: Macmillan Co. 1925. Pp. 157.

In spite of the number of works upon scientific method which have recently appeared, there is still an urgent need for one which, while being intelligible to the less advanced student, is at the same time sufficiently analytic to warrant serious consideration. Broad, Cassirer, Whitehead, and Johnson, to name only a few, are highly significant in their contributions to the logic of scientific method, but they are quite obviously too difficult for the uninitiated layman. On the other hand, the authors of most of the elementary textbooks in logic, in their treatments of the inductive aspects of thinking, give a mere surface analysis, and in their desire to maintain intelligibility, either avoid entirely some of the most fundamental problems of scientific explanation, or else simply suggest such problems with little or no significant discussion. Professor Wolf's book, I must confess, lies in the second group.

The most disappointing aspect of the book is its brevity. The complexity of the subject makes it impossible to present an adequate discussion in 160 pages, even by limiting one's treatment to the "elements." Without doubt most of what the author says is correct, and there are moments suggestive of real insight. But in his acknowledged proposal to present a discussion of scientific method without the "encumbrances" of psychological and philosophical considerations, and especially in the satisfactory degree to which he has carried out his proposal, he has greatly lessened the value of what might originally have been a contribution to the field.

The topics discussed are the usual ones: observation, analysis, imagination, analogy, classification, statistics, natural law, and probability. What novelty the book possesses is due to the following: a discussion of the evolutionary and comparative methods, a restatement in less ambiguous terminology of Mill's methods, and a very suggestive chapter on scientific explanation.

Professor Wolf's discussion of causation is apparently a justification for something analogous to the common-sense idea of cause "producing" effect. In our search for order in nature, he maintains, we come upon certain uniformities, either of coexistence or of sequence. It is one of the fundamental problems of science to determine in which of these uniformities the facts or factors are "connected." The author defines a connected relation between two facts

as that which holds when "one of them is the condition of the other" (107). Furthermore, by a condition of anything is meant whatever is indispensable to that thing or event, *etc.*, or that in the absence of which the thing will not be, or the event will not happen, or at least they will be different." Yet condition is not to be confused with cause, for "by the cause of an event or result is meant the minimum totality of conditions each of which is indispensable and all of which are together just sufficient to bring about that result" (109). That the cause, in order to "bring about the result," must be more than the "invariable antecedent" is clearly indicated in a distinction which is made between causal connections and other uniformities. "The causal conditions are believed to supply the matter and energy of the consequent or effect," while in the case of uniformities of sequence "there is no question of the conversion of one (factor) into another" (110).

It is impossible to tell in view of the brevity of Professor Wolf's discussion, just how this "conversion" is to be interpreted. Any anthropomorphism which may be involved in such a conception, the author contends, is no reason for its rejection, for every notion in science sins in the same way; without anthropomorphism science must be dumb. Furthermore, some such conception of causation seems to be a necessary aid to the understanding of "the continuity of natural events," for in its absence "each succeeding state of nature would appear to follow the preceding state by a kind of miracle" (112). I am certain that most positivists would object to this; abolition of the idea of "production" does not necessarily imply resorting to the notion of "miracle." It is hard to tell which of these notions would be more distasteful to the positivist. As a matter of fact, of course, he has nothing to do with either.

The author's discussion of scientific explanation contains a wealth of suggestive material, though its sketchy nature makes comment impossible. Could I be sure that I understood the author, I should disagree with him in certain fundamental points.

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Complacency, the Foundation of Human Behavior. ROBERT BRUCE RAUP. Introduction by WILLIAM HEARD KILPATRICK. New York: The Macmillan Co. 1925. Pp. xii + 201.

The author of this book defends the thesis that "all behavior arises as a consequence of the disturbance of a condition which we have chosen to call 'complacency,' and that the tendency of behavior is always toward the resumption of a condition of complacency which shall adequately supplant the one disturbed." The word

"complacency" is "here used in its etymological sense more than in accordance with its popular meaning of smugness or self-satisfiedness."

Physical and chemical equilibrium and biological adjustment are subsumed under this complacency, which is viewed as the foundation of all behavior both in the individual's relationship with his natural and his human environment and as a physiological explanation of that behavior. Where others have stressed stimulus-response, purposive striving, or problem-solving, the author shifts the emphasis from the process to the end condition which, by whatever means, continually tends to reëstablish itself.

His method is a painstaking analysis of the pertinent writings of such men as Loeb, Jennings, Ostwald, Kempf, Crile, Thorndike, Woodworth, Dewey, and others, from whom he quotes liberally to show the existence of facts supporting his theory. Its usefulness lies probably in its new terminology for mental maladjustment and habit, and in its consequent re-interpretation of some of the major problems of the philosophy of education and of experience. But its experimental value may well be doubted, for though it may be desirable to have a term which includes adjustment and chemical equilibrium, the analogy thus suggested is not thereby explained; and whether it be merely an analogy or a real identity is a question for the analysis of behavior in the concrete—a problem on which little light is thrown by a new terminology.

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JOURNALS AND NEW BOOKS

INTERNATIONAL JOURNAL OF ETHICS. Vol. XXXVI, No. 4. Religion and Experimentation: *G. A. Tawney.* The Theory of the Rational Good: *Olaf Stapledon.* Idealism, Realism, and the Social Order: *V. S. Yarros.* The Nature of Æsthetic Experience: *G. H. Mead.* Beauty and Goodness: Art and Morality: *H. E. Cory.* Art, Truth, and Conduct: *C. E. Whitmore.*

JOURNAL OF EXPERIMENTAL PSYCHOLOGY. Vol. IX, No. 3. Studies in Psychometric Theory: *E. Culler.* Specific Serial Learning; A Study of Backward Association: *H. Cason.* Apparent Visual Movement and the *Gestalt: G. D. Higginson.* A Modification of the Lipps-Meyer Law: *P. R. Farnsworth.* Princeton Psychological Laboratory: *H. S. Langfeld.*

JOURNAL DE PSYCHOLOGIE. XXIII^{e} Année, No. 5. Derniers résultats des recherches sur le travail des hémispheres cérébraux: *P. Pawlow.* Essai de psychogramme professionnel. Étude expéri-

mentale sur les ouvriers maçons: *J. Drabs.* Observations et remarques sur la mentalité du premier âge: *J. Pérès.* Note sur quelques cas de paragraphie infantile: *F. Naville* et *R. de Saussure.*

Revue Neo-Scolastique de Philosophie. XXVIII Année, No. 10. La Personnalité et la Philosophie de Cardinal Mercier, by M. De Wulf, L. Noël, N. Balthasar, P. Harmignie, L. Legrand, P. Charles.

Psychological Bulletin. Vol. 23, No. 5. The Psychogalvanic Reflex: *H. Woodrow.* Recent Theories of Laughter: *C. M. Diserens.* No. 6. Proceedings of the 5th Annual Meeting of the Western Psychological Association: *W. R. Mills.* Our Mass Neurosis: *T. Burrow.*

Alexander, Hartley Burr: L'art et la Philosophie des Indiens de l'Amérique du Nord. Série de Conférences faites à la Sorbonne aux mois d'Avril et de Mai, 1925. Precédée d'une Preface par A. Van Gennep. Illustré. Paris: Ernest Leroux. 1926. iii + 118 pp.

Bridges, Horace J., Editor: Aspects of Ethical Religion. Essays in Honor of Felix Adler on the Fiftieth Anniversary of his Founding of the Ethical Movement, 1876. By his Colleagues: Stanton Coit, D. S. Muzzey, W. M. Salter, A. W. Martin, Henry Neumann, G. E. O'Dell, Percival Chubb, H. J. Bridges, H. J. Golding, Nathaniel Schmidt, Harry Snell, G. A. Smith, R. D. Kohn, Wilhelm Boerner, J. L. Elliot, R. F. Dewey, Rudolph Penzig, S. B. Weston, James Gutmann. New York: American Ethical Union. 1926. 425 pp. $3.00.

Hartmann, Leopold: Sind Naturgesetze veränderlich? Eine phänomenologische Untersuchung als Beitrag zur Grundlegung der Naturwissenschaften. Halle: Max Niemeyer. 1926. 89 pp. 3.50 G. M.

NOTES AND NEWS

The Fourth Annual Meeting of the Australasian Association of Psychology and Philosophy was held at the University of Melbourne, May 20 and 21, 1926. The Presidential Address was given by Professor J. McKellar Stewart, entitled "Present Tendencies in Ethics." Other papers on the following subjects were given: "The Psychologist in Service" by Professor E. Morris Miller; "The Processes of Thought" by Dr. A. H. Martin; "Mental Defect" by Dr. C. R. McRae; "Aspects of Behaviourist Psychology" by Mr. W. M. Ball; "The Philosophical Interest in Relativity" by Dr. Love; "Doctrine of Substance in Descartes and Spinoza" by Mr. R. Jackson.